International Journal of Advanced Trends in Engineering, Science and Technology(IJATEST)Volume.4,Special Issue.1Dec.2016

A SURVEY OF VARIOUS OPTIMIZATION METHODS FOR DETECTION OF CANCER ON MEDICAL IMAGES

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ABSTRACT

Nowadays, abnormal tissues growth has become one of the main causes for increasing mortality among off springs and adults. Normally tumors will start little and cultivate with time. Detection of tumor like diseases are extremely challenging in human brain, because differentiating the tissues of the brain is complex. Tumor growth may leads to cancer such as lung cancer, thyroid cancer etc. In recent years lung cancer is growing at a frightening rate in the world. The intensity of some brain tissues, edema and tumor may appear as normal tissues. The accurate tumor detection in medical imaging is necessary to diagnose the diseases like brain tumor and lung cancer. Generally the brain tumor and lung cancer is detected by radiologists on medical images through a comprehensive examination of MR/CT images, which takes significantly a longer time and not accurate.

Recently Imaging technology has evolved enormously where different image processing techniques are used in medical images to study the details. Image processing is a progressive diagnostic tool for medical purposes. Based on the imaging technology a new and efficient optimization method is proposed for detection of brain tumor and lung cancer. In this work various optimization algorithms is proposed for accurate detection of brain tumor and lung cancer in MRI and CT images. Also in this work the various parameters like PSNR, MSE, Image quality, specificity etc. are determine and compared with the Genetic algorithm, Cuckoo search (CSO) and particle swarm optimization techniques (PSO).). work the various parameters like PSNR, MSE, Image quality, specificity etc.

Keywords: Tumor, PSNR, Optimization,MSE

INTRODUCTION:

Cancer

Cancer is actually a group of many related diseases that all have to do with cells. Cells are the very small units that make up all living things, including the human body. There are billions of cells in each person's body. Cancer happens when cells that are not normal grow and spread very fast. Normal body cells grow and divide and know to stop growing. Over time, they also die. Unlike these normal cells, cancer cells just continue to grow and divide out of control and don't die when they're supposed to.

Cancer cells usually group or clump together to form tumors (say: TOO-mers). A growing tumor becomes a lump of cancer cells that can destroy the normal cells around the tumor and damage the body's healthy tissues. This can make someone very sick.

Sometimes cancer cells break away from the original tumor and travel to other areas of the body, where they keep growing and can go on to form new tumors. This is how cancer spreads. The spread of a tumor to a new place in the body is called metastasis (say: meh-TASS-tuh-sis).

We are using two types of scans to detect the tumour in human body. Those are:

1. MRI Scan

2. CT Scan

MRI Scan

An MRI scan is a medical test that uses a magnetic field and radio waves to create a detailed picture of organs and other structures inside the body. MRI stands for magnetic resonance imaging.MRI scans are useful for diagnosing conditions such as torn ligaments and tumors and are especially valuable for examining the brain and spinal cord. Since an MRI scan uses a magnetic field, it is important for the patient to inform his health care professional if he has pieces metal in his body, such as from shrapnel or a bullet injury. It is also necessary for the patient to mention any implanted devices, such as pacemakers or artificial joints.

CT scan

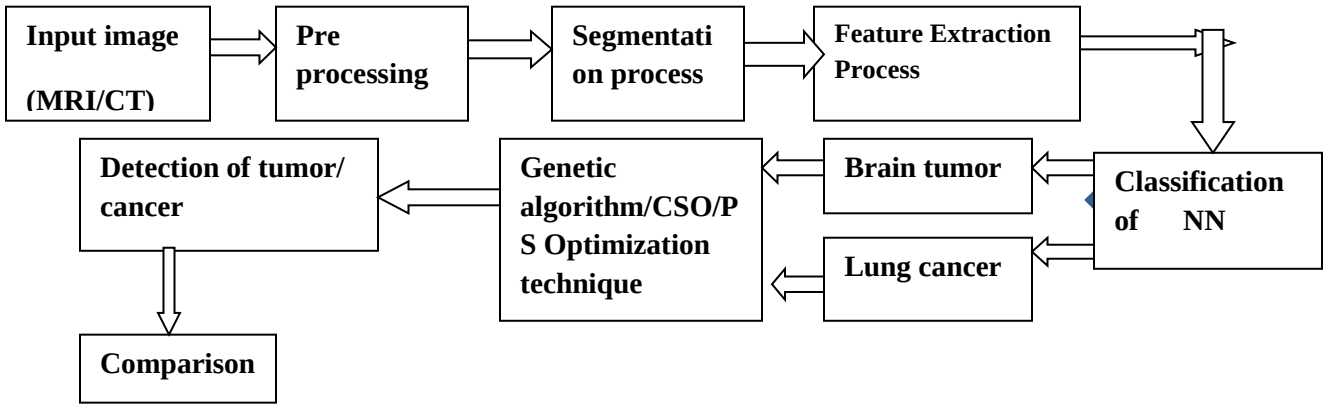
Computerized tomography, or CT, scans provide several cross-sectional X-ray images of a specific area of the body as ordered by a doctor, according to WebMD. The machines are used to detect tumors, bone injuries, tissue changes, internal bleeding, aneurysms, infections, kidney stones, organ inflammation and abscesses.

Optimization technique

A feasible region is an area defined by a set of coordinates that satisfy a system of inequalities. The region satisfies all restrictions imposed by a linear programming scenario. The concept is an optimization technique. For example, a planner can use linear programming to determine the best value obtainable under conditions dictated by several linear equations that relate to a real-life problem.

To solve the problem mathematically, a planner first graphs the inequalities that define the production constraints and forms a feasibility region on the x, y-plane. pinpoints the coordinates of the corners of the region, such as the coordinates of the intersection points between any two sets of lines. Applying these coordinates in a given optimization formula can help reveal the highest or lowest possible value; with linear programming theory, optimal conditions must occur at one of the coordinates of the feasible region. To maximize the optimization formula P(x, y) = 3x + 5y, draw the lines of the inequalities on a graph defining the feasible region: x + y 10; x + y 5; y - x 3 and y - x -4.

Proposed system Block diagram:



In Proposed system we are comparing the results of detecting a tumor in human body by using different optimization techniques like Genetic algorithm, Cuckoo search and Particle Swarm Optimization technique by giving input as CT image /MRI image. After getting input as either MRI/CT image, the image will be preprocessed for to obtain image clearly and the image wil be divided as few segments to find the segment where the tumor affect and then finally the tumor segment will extracted by using extraction process and classifying the tumor, is it brain tumor or lung cancer by using classification of Neural networks.After identify the cancer we are comparing the various optimization techniques results.

Optimization Algorithm

Genetic algorithm

In computer science and operations research, a **genetic algorithm** (**GA**) is a metaheuristic inspired by the process of natural_selection that belongs to the larger class of evolutionary algorithms (EA). Genetic algorithms are commonly used to generate high-quality solutions to optimization and search problems by relying on bio-inspired operators such as mutation, crossover and selection.

Particle Swarm Optimization technique

The process of PSO algorithm in finding optimal values follows the work of this animal society. Particle swarm optimization consists of a swarm of particles, where particle represent a potential solution. the particle of the swarm fly through hyperspace and have two essential reasoning capabilities: their memory of their own best position - local best (lb) and knowledge of the global or their neighborhood's best - global best (gb). Position of the particle is influenced by velocity Let xi(t) denote the position of particle i in the search space at time step ; unless otherwise stated, t denotes discrete time steps. The position of the particle is changed by adding a velocity vi(t) to the current position

Xi(t+1)= xi(t)+vi(t+1)

Cockoo Search optimization technique

Cuckoo search is an optimization algorithm developed by Xin-she Yang and Suash Deb in 2009. It was inspired by the obligate brood parasitism of some cuckoo species by laying their eggs in the nests of other host birds (of other species). Some host birds can engage direct conflict with the intruding cuckoos. For example, if a host bird discovers the eggs are not their own, it will either throw these alien eggs away or simply abandon its nest and build a new nest elsewhere. Some cuckoo species such as the New World brood-parasitic Tapera have evolved in such a way that female parasitic cuckoos are often very specialized in the mimicry in colors and pattern of the eggs of a few chosen host species [3] Cuckoo search idealized such breeding behavior, and thus can be applied for various optimization problems.

Parameters

Genetic algorithm - moderate

Particle swarm optimization technique - low

Cuckoo search optimization technique - high

Conclusion

In this finally we can conclude that the cuckoo search is best optimization technique to identify the tumor and it require less time when compare with PSO and Genetic algorithm. After comparing the various optimization techniques its parameters as mean value, peak signal to noise ratio (PSNR) and image quality. Cuckoo search has obtained good result when compare with PSO and Genetic algorithm.

Comparison of optimization techniques:

S.NO	Optimization algorithms	Mean	PSNR	Image quality
1.	PSO	High	Low	Moderate
2.	Genetic Algorithm	High	Moderate	Moderate
3.	Cuckoo Search	High	High	High